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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

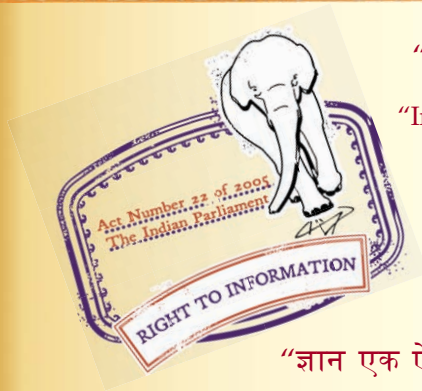
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 308 (1988): Dissolved acetylene (gas) [CHD 6: Industrial Gases]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 308 - 1988
(Reaffirmed 2010)

Indian Standard

**SPECIFICATION FOR
DISSOLVED ACETYLENE (GAS)**

(Third Revision)

Fourth Reprint MAY 2007
(Including Amendment 1)

UDC 662.766.6

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

AMENDMENT NO. 1 MAY 1993
TO
IS 308 : 1988 SPECIFICATION FOR DISSOLVED
ACETYLENE (GAS)
(Third Revision)

(Page 2, clause A-2) — The existing matter shall be replaced by the following:

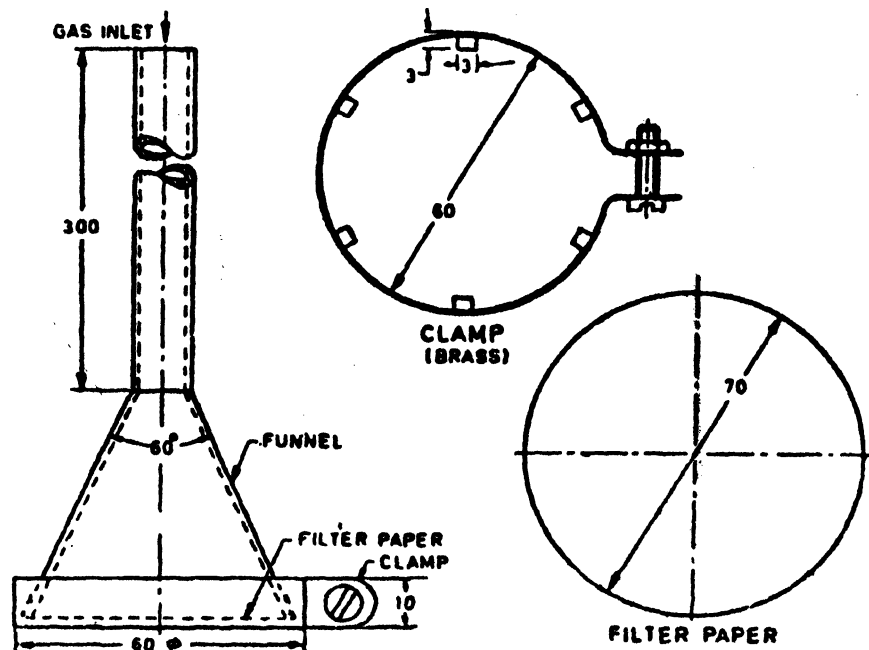
'A.2 QUALITATIVE TEST

A-2.1 The cylinders containing dissolved acetylene gas shall be purged before testing through pressure regulator at a discharge pressure of 0.2 kg/cm^2 to vent out approximately one-sixth of its contents before testing.

A-2.2 Reagent

A.2.2.1 *Silver Nitrate Solution* — 0.1 percent (m/v).

A-2.3 Apparatus — Funnel as shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 FUNNEL ASSEMBLY

A-2.4 Procedure — Place a piece of white filter paper saturated with silver nitrate solution over the mouth of the funnel and secure with clamp. Fit a regulator to the cylinder and purge it for about 2 minutes. Attach the Tygon tubing from the regulator of the acetylene tank to the funnel tip. Set the regulator gauge pressure at not more than 0.2 kgf/cm². Release the needle valve for 30 seconds. If the silver nitrate paper turns brown or black, the gas shall be considered to have failed the test.

A-2.4.1 The filter paper shall be used immediately after saturation, it shall not be allowed to dry, otherwise the test will be void.

A-2.5 However, in the case of dispute, the dissolved acetylene gas shall be quantitatively analysed as prescribed in **A-4** and **A-5** to determine the sulphur and phosphorus compounds. If quantitatively the sample conforms to the requirements of this specification, it shall be deemed to have passed the test.'

(Page 2, clause **A-3.1**) — Substitute Fig. 1 by Fig. 2.

(Page 3, Fig. 1 and 2) — Substitute Fig. 1 and 2 by Fig. 3 and 4, respectively.

(Page 3, clause **A-4.1.2**) — Substitute Fig. 2 by Fig. 3.

(Page 5, clause **A-6**) — The existing matter shall be replaced by the following:

'A-6 DETERMINATION OF MOISTURE

A-6.1 Apparatus

A-6.1.1 Gas Meter — accurate to one percent.

A-6.1.2 Absorption Train — two tared U-tubes connected in series and containing anhydrous calcium chloride.

A-6.2 Procedure

Connect through a teflon tube, the gas sample reservoir (cylinder) and purge the tube at the rate of 5 to 6 litres per hour for one hour. Connect the tube with the U-tube (absorption train) and pass the gas at the rate of 4 to 5 litres per hour for about 30 minutes. Weigh the U-tube (absorption train), keeping both the ends closed. Pass the gas through the absorption train at the rate of 4 to 5 litres per hour for 5 to 6 hours. Disconnect the gas supply and again record the meter reading, barometric pressure and temperature. Remove the U-tube (absorption train) and weigh it, keeping both the ends closed with the same stoppers.

A-6.3 Calculation

Convert in litres, the volume of the gas taken for the test to that at NTP, and from this, calculate the mass of the gas on the basis that 22.4 litres of gas are equivalent to 26.04 g of acetylene. Express the increase in mass of the U-tubes (absorption train) as percentage of the mass of the gas taken for the test.'

(Page 5, clause **A-7.1**) — Substitute Fig. 3 by Fig. 4.

(Page 6 Fig.: 3) — Substitute Fig. 3 by Fig. 4.

(CHD 006)

Indian Standard

SPECIFICATION FOR DISSOLVED ACETYLENE (GAS)

(*Third Revision*)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards on 29 April 1988, after the draft finalized by the Industrial Gases Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1953 and subsequently revised in 1962 and 1977. The standard is now being revised again to amend the determination of total impurities insoluble in acetone. Table 1 has been substituted by a new correction table of solubilities of water and acetone. The qualitative test as well as the determination of total impurities insoluble in water have been modified.

0.3 In the preparation of this standard, assistance has been taken from the following publications:

G/Chemicals-20 D. Acetylene gas, dissolved, for industrial, marine and aeronautical purposes. Directorate General of Supplies & Disposals, Government of India.

Federal Specification BB-A-106. Acetylene, dissolved, technical grade. Federal Supply Service, USA.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

◆Rules for rounding off numerical values (*revised*),

1. SCOPE

1.1 This standard prescribes the requirements, and methods of sampling and test for dissolved acetylene (gas).

1. REQUIREMENTS

2.1 Description — The material consists essentially of acetylene dissolved in acetone (*see* IS : 170-1976*) or any other solvent which shall be contained in a homogeneous porous substance packed in a cylinder so that it is not deemed as explosive within the meaning of the *Indian Explosives Act, 1884* with such modification as may be ordered by duly constituted authority.

2.2 Qualitative Test — The material shall satisfy the qualitative test prescribed in A-2.

2.3 When tested according to the methods prescribed in Appendix A, dissolved acetylene (gas) shall comply with the requirements given in Table 1. Reference to the relevant clauses of Appendix A is given in col 4 of Table 1.

2.4 Additional Requirement for Navigational Illuminant — When the material is required for use as illuminating gas for navigational lights, it

*Specification for acetone (*second revision*).

shall contain not more than 0.001 percent by volume of chloro-compounds when tested according to the method prescribed in A-7.

3. PACKING AND MARKING

3.1 Packing — Dissolved acetylene (gas) shall be compressed into cylinders of approved design. The cylinders shall comply with the requirements given in Notification No. M-1268 (1) of 9 January 1939, published by the Government of India, with such modifications as may be ordered from time to time by the Chief Inspector of Explosives, Government of India, or other duly constituted authority.

3.2 Marking — Marking, painting and labelling (*see also* IS : 1260 (Part 1)-1973* and IS : 1446-1985†) of cylinders containing dissolved acetylene (gas) shall be in accordance with the requirements of the Notification cited in 3.1 and with the modifications as may be ordered from time to time by the Chief Inspector of Explosives, Government of India, or any other duly constituted authority.

*Specification for pictorial markings for handling and labelling of goods : Part 1 Dangerous goods (*first revision*),
†Classification of dangerous goods (*first revision*).

3.2.1 Cylinders containing dissolved acetylene (gas) may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986, and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

4. SAMPLING AND CRITERION FOR CONFORMITY

4.1 Subject to agreement between the purchaser and the supplier, samples shall be drawn either from the filling rack during the time the cylinders are being filled or from 5 percent of the cylinders after blowing off about 15 percent of the gas contained in them.

4.2 Two separate samples of the gas shall be drawn from the filling rack for tests for deciding conformity to the standard.

4.3 The material shall be considered to be conforming to the standard only if both the samples satisfy all the prescribed requirements.

TABLE 1 REQUIREMENTS FOR DISSOLVED ACETYLENE (GAS)
(Clause 2.3)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO CL NO. IN APPENDIX A)
(1)	(2)	(3)	(4)
i)	Total impurities insoluble in acetone, percent by volume, <i>Max</i>	4.0	A-3
ii)	Sulphur compounds (as H ₂ S), percent by volume, <i>Max</i>	0.02	A-4
iii)	Phosphorus compounds (as PH ₃) percent by volume, <i>Max</i>	0.01	A-5
iv)	Moisture, percent by mass, <i>Max</i>	0.25	A-6

APPENDIX A

(Clauses 22. 23 and 2.4; and Table 1)

METHODS OF TEST FOR DISSOLVED ACETYLENE (GAS)

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. QUALITATIVE TEST

A-2.1 Reagent

A-2.1.1 *Silver Nitrate Solution* — 10 percent (*m/v*).

A-2.1.2 *Test Paper* — absorbant, test paper should be kept clean and dry.

A-2.2 Procedure

A-2.2.1 Carefully wipe the bottle neck (*see* Note 1) with a clean cloth to remove dirt or accumulation of silver nitrate deposits. Wet the test paper with one drop of test solution and wait for this to be absorbed and spread over in the test paper. Discolouration indicate contamination of the test solution and/or test paper. If so it should be discarded and replaced.

NOTE 1—As glass stoppers make an air tight joint with the bottle neck, the bottles are liable to burst if

exposed to sunlight or heat. So the bottles must be kept stoppered in a cool and dark place.

A-2.2.2 Allow the gas from the test point, say from top tray of purifier/charging rack or cylinder to discharge for nearly 10 seconds. The moistened test paper should be held at about 3 cm away from the test point for approximately 5 seconds. To avoid contamination, the moistened part of test paper should not be allowed to come into contact with anything other than gas stream under test. Test paper should be moistened only immediately prior to use. A separate test paper should be used for each test

A-2.2.3 If the test paper remains white, the acetylene is pure, if the test paper is coloured light brown, the acetylene is partly purified. If the test paper is coloured dark brown or black, acetylene is unpurified.

A-2.2.4 The compound formed on test paper during testing may become explosive under certain conditions, particularly if it is dry. Used test papers should be saturated with water and disposed off as waste paper.

A-3. DETERMINATION OF TOTAL IMPURITIES INSOLUBLE IN ACETONE

A-3.1 Apparatus — Assemble the apparatus as shown in Fig. 1.

*Specification for water for general laboratory use (*second revision*).

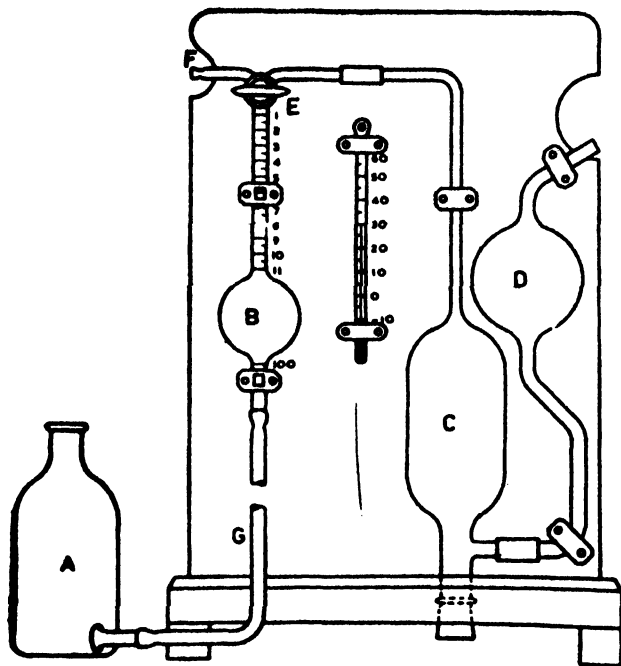


FIG. 1 ASSEMBLY OF APPARATUS FOR DETERMINATION OF TOTAL IMPURITIES INSOLUBLE IN ACETONE

A-3.2 Reagent

A.3.2.1 *Acetone* — See IS : 170-1976*.

A-3.3 *Procedure* — Turn the three-way cock *E* to connect *B* with *C* and pour acetone into *D* until *C* is completely filled and *D* is about one-third filled. Turn *E* to connect *B* with *F*. Pour water into *A* and fill *B* by raising *A* until water emerges from tube *F*. Turn *E* through 90°, and then turn it to connect *B* with *C*. Lower *A* to draw up acetone to *E*. Again turn the cock through 90°, and then turn it to connect *B* with *F*. Raise *A* until water emerges from *F* and turn the cock to horizontal position. Attach a thermometer to the apparatus. Now connect the gas sample reservoir to *F*, turn the cock *E* to connect *B* with *F* and then lower *A* to draw the gas into *B*. Collect a sufficient amount of the gas in *B* and turn the cock *E* to horizontal position. Allow the water in *B* to drain for 30 seconds. Bring the water in *A* and *B* to the same level. The level of water in *B* should be at 100-ml mark if the exact amount of gas required has been taken. If the level is not at 100-ml mark, adjust the intake of the gas in *B* in such a manner as to ensure that the levels of water in *B* and *A* are brought simultaneously to the 100-ml mark. Turn *E* through 90°, and turn it again to connect *B* and *C*. Pass over water from *A* through Bright to the end of the capillary tube at the top of *C* and set the cock *E* to horizontal position. Shake the apparatus

until the absorption of the gas by acetone is complete. Lower *A*, turn *E* to connect *B* with *C* and draw the unabsorbed gas back into *B*. Turn the cock *E* to the horizontal position as soon as acetone column from *C* reaches *E*. Allow the water in *B* to drain for 30 seconds. Bring the water in *A* and *B* to the same level and note the reading on the scale and the temperature on the attached thermometer. Record the temperature in °C from the thermometer.

A-3.3.1 Fresh acetone should be taken after ten determinations. Find the percent of impurity as indicated by the unabsorbed portion of the gas in the capillary of vessel *B*. Take corrected percent of impurities from Appendix B.

A-4. DETERMINATION OF SULPHUR COMPOUNDS

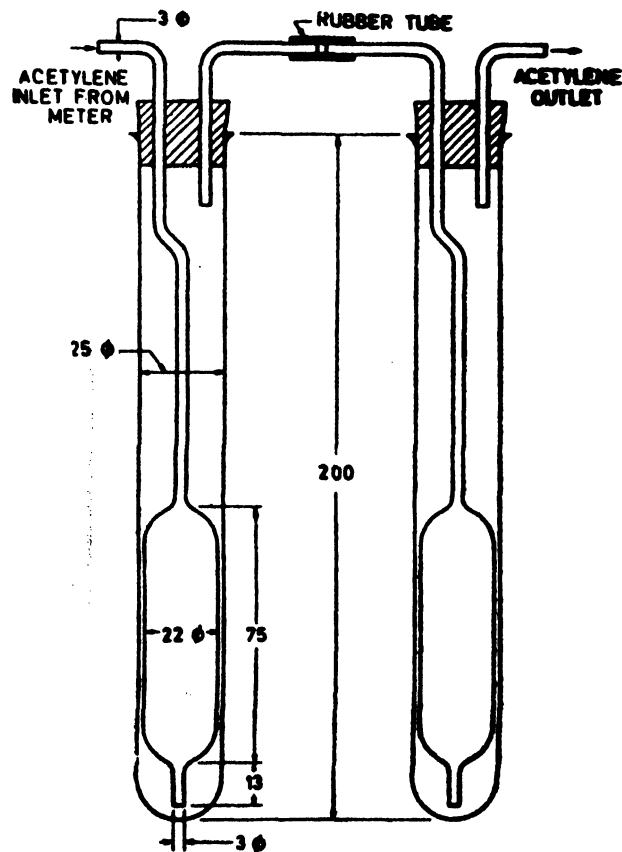
A-4.1 Apparatus

A-4.1.1 *Gas Meter* — Accurate to one percent.

A-4.1.2 *Gas Scrubbers* — Two, of a suitable design, preferably as shown in Fig. 2.

A-4.2 Reagents

A-4.2.1 *Sodium Hypochlorite Solution* — containing 3 to 3.5 percent of available chlorine. The solution shall be saturated with sodium bicarbonate in excess.



All Dimensions in Millimetres.

FIG. 2 DETAILS OF GAS SCRUBBERS

*Specification for acetone (second revision).

A-4.2.2 Concentrated Hydrochloric Acid — see IS : 265-1976*.

A-4.2.3 Barium Chloride Solution — Approximately 10 percent (*m/v*).

A-4.3 Procedure — Transfer 25 ml of sodium hypochlorite solution into each of the two scrubbers and pass a known volume (approximately 10 to 15 litres) of gas (see A-4.3.1) at the rate of 2 litre/h. Note the barometric pressure and temperature. Transfer the solution in the gas scrubbers into a 100-ml beaker, wash the scrubbers with water into the beaker and boil to remove acetylene. Divide the hypochlorite solution into two equal parts and preserve one of the parts for the determination of phosphorus compounds as in A-5. Acidify the other part with concentrated hydrochloric acid and heat to boiling. Filter the hot solution through a filter paper (Whatman No. 41 or equivalent), washing the residue with hot water till the combined volume of the filtrate is about 125 ml. Heat the solution and to the hot solution add a slight excess of hot barium chloride solution. Digest the precipitate for 15 minutes and allow the contents of the beaker to stand for 4 hours. Filter the precipitate through a tared Gooch crucible or sintered glass crucible (G No. 4) and wash the precipitate with hot water till it is free from chlorides. Dry the crucible with its contents to constant mass at 105 to 110°C. Preserve the filtrate for the determination of phosphorous compounds (A-5.2).

Carry out blank determination without the gas and with another 25 ml of sodium hypochlorite solution, and the same quantities of other reagents. Find the mass of the precipitate, if any.

A-4.3.1 Special precaution shall be taken when treating the gas with sodium hypochlorite solution as there is a possibility of the formation of explosive nitrogen trichloride from traces of ammonia that might be present in the gas.

A-4.3.2 Excess of barium chloride is necessary to reduce the solubility of barium sulphate. Precipitation in hot solution by addition of barium chloride in a slow stream with stirring minimizes mechanical occlusion of barium chloride and gives a coarse precipitate which is less soluble in acids.

A-4.4 Calculation — Convert in litres the volume of gas taken for the test to that at normal temperature and pressure (NTP). From the mass of barium sulphate, calculate the volume of sulphur compounds (as H_2S) on the basis that 1 g of barium sulphate is equivalent to 0.096

litre of hydrogen sulphide at NTP, and express the result as percentage by volume, as follows:

$$\text{Sulphur compounds (as } H_2S \text{)} = \frac{(A-B)}{V} \times 19.2$$

percent by volume

where

A = mass in g of barium sulphate in the test with the gas sample,

B = mass in g of barium sulphate in the blank, and

V = volume in litres at NTP of the gas taken for the test.

A-5. DETERMINATION OF PHOSPHORUS COMPOUNDS

A-5.1 Reagents

A-5.1.1 Concentrated Nitric Acid — See IS : 264-1976*.

A-5.1.2 Methyl Red Indicator — Dissolve 0.1 g of methyl red in 100 ml of rectified spirit conforming to IS : 323-1959†.

A-5.1.3 Ammonium Hydroxide — Relative density 0.92.

A-5.1.4 Ammonium Molybdate Solution — Dissolve 100 g of molybdic anhydride in a mixture of 150 ml of ammonium hydroxide and 250 ml of water. Pour the solution slowly and with constant stirring into a cooled mixture of 500 ml of concentrated nitric acid and 1 100 ml of water. Keep the final mixture in a warm place for several days or until a portion heated to 40°C deposits no yellow precipitate of ammonium phosphomolybdate. Decant the solution from any sediment and preserve in a glass-stoppered bottle.

A-5.1.5 Ammonium Nitrate — Powder.

A-5.1.6 Ammonium Nitrate Solution — Approximately 5 percent.

A-5.1.7 Methyl Orange Indicator — Dissolve 0.1 g of methyl orange in 100 ml of water.

A-5.1.8 Standard Sodium Hydroxide Solution — 0.1 N.

A-5.1.9 Standard Hydrochloric Acid — 0.1 N.

*Specification for hydrochloric acid (second revision).

*Specification for nitric acid (second revision).

†Specification for rectified spirit.

A-5.1.10 Phenolphthalein Indicator — Dissolve 0.1 g of phenolphthalein in 100 ml of rectified spirit conforming to IS : 323-1959*.

A-5.2 Procedure — Acidify the solution preserved in A-4.3 with concentrated nitric acid, evaporate it to dryness, and bake the residue for 1 hour (due caution should be exercised in adding the nitric acid). Allow to cool. Add 80 to 100 ml of hot water and 3 ml of concentrated nitric acid, and heat to boiling. Filter the hot solution through a filter paper (Whatman No. 41 or equivalent), washing the residue with hot water. Boil the filtrate for 5 minutes and make neutral to methyl red by addition of ammonium hydroxide. Add 5 g of ammonium nitrate followed by 3 ml of concentrated nitric acid. Heat the solution to $70 \pm 1^\circ\text{C}$. Filter through a filter funnel with an ordinary 9-cm filter paper (Whatman No. 1 or equivalent) and wash the precipitate with ammonium nitrate solution until the filtrate is not acidic to methyl orange indicator. Now transfer the precipitate together with the filter paper into the flask in which the precipitation was carried out and dissolve the precipitate by adding in excess a known volume of standard sodium hydroxide solution through the funnel in which the filtration was carried out. Rinse the funnel with water into the flask. Shake the flask until the yellow precipitate is dissolved and titrate against standard hydrochloric acid using phenolphthalein as indicator.

Carry out a blank determination without using the gas, and with another 25 ml of the sodium hypochlorite solution and the same quantities of other reagents. Find the volume of standard sodium hydroxide solution used.

A-5.3 Calculation — Calculate the volume of phosphorus compounds (as PH_3) on the basis that 1 ml of normal standard sodium hydroxide solution is equivalent to 0.000 97 litre of Phosphine (PH_3) at NTP, as follows:

$$\frac{\text{Phosphorus compounds (as } \text{PH}_3\text{), percent by volume}}{\text{volume}} = \frac{0.194 (A - B) N}{V}$$

where

A = volume in ml of standard sodium hydroxide solution used in the test with gas sample,

B = volume in ml of standard sodium hydroxide solution used in the blank,

N = normality of standard sodium hydroxide solution, and

V = volume in litres at NTP of the gas taken for the test in A-4.3.

*Specification for rectified spirit.

A-6. DETERMINATION OF MOISTURE

A-6.1 Apparatus

A-6.1.1 Gas Meter — accurate to one percent.

A-6.1.2 Absorption Train — Two tared U-tubes connected in series and containing anhydrous calcium chloride.

A-6.1.2.1 Prior to initial weighing of the U-tubes, completely displace the air contained in them by the gas to be tested.

A-6.2 Procedure — Connect the inlet of the U-tubes to the gas sample reservoir. Record the meter reading, barometric pressure and temperature. Pass the gas through absorption train at the rate of 4 to 5 l/h for 5 to 6 hours. Disconnect the gas supply and again record the meter reading, barometric pressure and temperature. Remove the U-tubes and weigh.

A-6.3 Calculation — Convert in litres the volume of the gas taken for the test to that at NTP, and from this calculate the mass of the gas on the basis that 22.4 litres of gas are equivalent to 26.04 g of acetylene. Express the increase in mass of the U-tubes as percentage of the mass of the gas taken for the test.

A-7 TEST FOR CHLORO-COMPOUNDS FOR NAVIGATIONAL ILLUMINANT

A-7.1 Apparatus — Assemble the apparatus as shown in Fig. 3 in an airtight steel cabinet with removable glass front. Suitable inlet and outlet pipes through the cabinet side shall be provided to allow the air stream and acetylene to be fed in and the excess of air and combustion products to be withdrawn.

A-7.2 Reagent

A-7.2.1 Standard Silver Nitrate Solution — 0.05 N.

A-7.2.2 Standard Sodium Chloride Solution — Dissolve 1.649 g of sodium chloride in water and make up the volume to 1 000 ml. Pipette out 10 ml of the solution, dilute with water and make up the solution to 1 000 ml. One millilitre of this solution contain 0.01 mg chloride (as Cl).

A-7.3 Procedure

A-7.3.1 In the scrubber containing silver nitrate solution acidified with nitric acid, add 16.0 ml of standard sodium chloride solution and assemble the apparatus. Draw, through the caustic soda scrubber a stream of air at the rate of about 65 l/h for 1 hour. Disconnect the silver nitrate scrubber and use it as a comparison standard.

NOTE — 16.0 ml of standard sodium chloride solution equivalent to 0.001 percent by volume of chloride in 5 litres of acetylene.

A-7.3.2 Replace in the assembly of apparatus another silver nitrate scrubber. Connect the inlet of the apparatus to the gas supply. Pass 5 litres of the gas at the rate of about 5 l/h to the pair of Bray burners mounted just within a glass dome. Also simultaneously draw, through the caustic soda scrubber, a stream of air at the rate of about 65 l/h into the glass dome, thus

providing air for the combustion through the silver nitrate scrubber.

A-7.4 The gas shall be considered to have passed the test if any opalescence or turbidity produced in silver nitrate solution with the gas is not greater than that produced in the comparison standard in A-7.3.1.

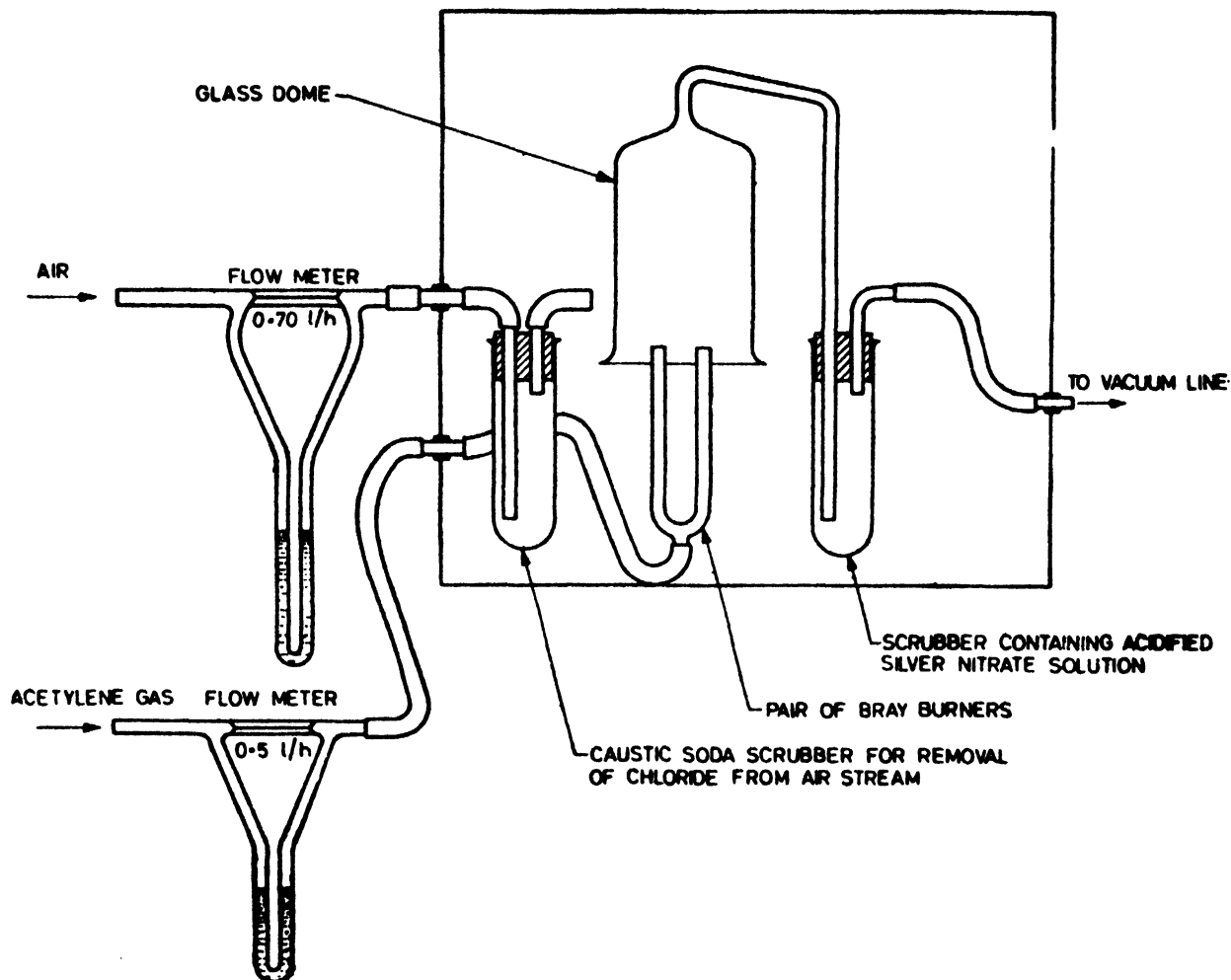


FIG. 3 ASSEMBLY OF APPARATUS FOR TESTING FREEDOM FROM CHLORO-COMPOUNDS

APPENDIX B

(Clause A-3.3.1)

CORRECTION TABLE OF SOLUBILITIES OF WATER AND ACETYLENE

<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>	<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>	<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>
(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	1000	9.0		10.00	8.0		10.00	7.0
	9.75	8.8		9.75	7.8		9.75	6.8
	9.50	8.6		9.50	7.6		9.50	6.7
	9.25	8.3		9.25	7.4		9.25	6.5
	9.00	8.1		9.00	7.2		9.00	6.3
	8.75	7.9		8.75	7.0		8.75	6.1
	8.50	7.7		8.50	6.8		8.50	6.0
	8.25	7.4		8.25	6.6		8.25	5.8
	8.00	7.2		8.00	6.4		8.00	5.6
	7.75	7.0		7.75	6.2		7.75	5.4
	7.50	6.8		7.50	6.0		7.50	5.3
	7.25	6.5		7.25	5.8		7.25	5.1
	7.00	6.3		7.00	5.6		7.00	4.9
O°C	6.75	6.1	10°C	6.75	5.4	21°C	6.75	4.7
	6.50	5.9		6.50	5.2		6.50	4.6
	6.25	5.6		6.25	5.0		6.25	4.4
to	6.00	5.4	to	6.00	4.8	to	6.00	4.2
9°C	5.75	5.2	20°C	5.75	4.6	30°C	5.75	4.0
	5.50	4.8		5.50	4.4		5.50	3.9
	5.25	4.7		5.25	4.2		5.25	3.7
	5.00	4.5		5.00	4.0		5.00	3.5
	4.75	4.3		4.75	3.8		4.75	3.3
	4.50	4.0		4.50	3.6		4.50	3.2
	4.25	3.8		4.25	3.4		4.25	3.0
	4.00	3.6		4.00	3.2		4.00	2.8
	3.75	3.4		3.75	3.0		3.75	2.6
	3.50	3.1		3.50	2.8		3.50	2.5
	3.25	2.9		3.25	2.6		3.25	2.3
	3.00	2.7		3.00	2.4		3.00	2.1
	2.75	2.5		2.75	2.2		2.75	1.9
	2.50	2.2		2.50	2.0		2.50	1.8
	2.25	2.0		2.25	1.8		2.25	1.6
	2.00	1.8		2.00	1.6		2.00	1.4
	1.75	1.6		1.75	1.4		1.75	1.2
	1.50	1.3		1.50	1.2		1.50	1.1
	1.25	1.1		1.25	1.0		1.25	0.9
	1.00	0.9		1.00	0.8		1.00	0.7
	0.75	0.6		0.75	0.6		0.75	0.5
	0.50	0.4		0.50	0.4		0.50	0.4
	0.25	0.2		0.25	0.2		0.25	0.2

<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>	<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>	<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>	<i>Temperature</i>	<i>Impurities Percentage (Volume)</i>	<i>Impurities Percentage Corrected (Volume)</i>
(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	10.00	6.00		10.00	5.00		10.00	4.00		10.00	2.50
	9.75	5.85		9.75	4.90		9.75	3.90		9.75	2.45
	9.50	5.70		9.50	4.75		9.50	3.80		9.50	2.40
	9.25	5.55		9.25	4.60		9.25	3.70		9.25	2.30
	9.00	5.40		9.00	4.50		9.00	3.60		9.00	2.25
					4.40		8.75	3.50		8.75	2.20
	8.75	5.25		8.75	4.25		8.50	3.40		8.50	2.10
	8.50	5.10		8.50	4.10		8.25	3.30		8.25	2.05
	8.25	4.95		8.25	4.00		8.00	3.20		8.00	2.00
	8.00	4.80		8.00							
					3.90		7.75	3.10		7.75	1.95
	7.75	4.65		7.75	3.75		7.50	3.00		7.50	1.85
	7.50	4.50		7.50	3.60		7.25	2.90		7.25	1.80
	7.25	4.35		7.25	3.50		7.00	2.80		7.00	1.75
	7.00	4.20		7.00							
					3.40		6.75	2.70		6.75	1.70
	6.75	4.05		6.75	3.25		6.50	2.60		6.50	1.60
	6.50	3.90		6.50	3.10		6.25	2.50		6.25	1.55
	6.25	3.75		6.25	3.00		6.00	2.40		6.00	1.50
	6.00	3.60		6.00							
					2.90		5.75	2.30		5.75	1.45
31°	5.75	3.45	36°	5.75	2.75	41°	5.50	2.20	46°	5.50	1.35
to	5.25	3.15	to	5.25	2.60	to	5.25	2.10	to	5.25	1.30
35°C	5.00	3.00	40°C	5.00	2.50	45°C	5.00	2.00	50°C	5.00	1.25
	4.75	2.85		4.75	2.40		4.75	1.90		4.75	1.20
	4.50	2.70		4.50	2.25		4.50	1.80		4.50	1.10
	4.25	2.55		4.25	2.10		4.25	1.70		4.25	1.05
	4.00	2.40		4.00	2.00		4.00	1.60		4.00	1.00
					1.90		3.75	1.50		3.75	0.95
	3.75	2.25		3.75	1.75		3.50	1.40		3.50	0.85
	3.50	2.10		3.50	1.60		3.25	1.30		3.25	0.80
	3.25	1.95		3.25	1.50		3.00	1.20		3.00	0.75
	3.00	1.80		3.00							
					1.40		2.75	1.10		2.75	0.70
	2.75	1.65		2.75	1.25		2.50	1.00		2.50	0.60
	2.50	1.50		2.50	1.10		2.25	0.90		2.25	0.55
	2.25	1.35		2.25	1.00		2.00	0.80		2.00	0.50
	2.00	1.20		2.00							
					0.90		1.75	0.70		1.75	0.45
	1.75	1.05		1.75	0.75		1.50	0.60		1.50	0.35
	1.50	0.90		1.50	0.60		1.25	0.50		1.25	0.30
	1.25	0.75		1.25	0.50		1.00	0.40		1.00	0.25
	1.00	0.60		1.00							
					0.40		0.75	0.30		0.75	0.20
	0.75	0.45		0.75	0.25		0.50	0.20		0.50	0.10
	0.50	0.30		0.50	0.10		0.25	0.10		0.25	0.05
	0.25	0.15		0.25							

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